PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION R

(PCT Article 36 and Rule 70)

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Applicant's	or age	nt's file reference	FOR FURTHER AC	TION		n of Transmittal of International amination Report (Form PCT/IPEA/416)			
International application No. International filing date PCT/EP 03/07567 14.07.2003					(day/month/year) Priority date (day/month/year) 15.07.2002				
		nt Classification (IPC) or be	oth national classification ar	nd IPC					
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Applicant BASELL	POL'	YOLEFINE GMBH et	al			· · · · · · · · · · · · · · · · · · ·			
1. This	interr	national preliminary exam and is transmitted to the	mination report has been applicant according to A	n prepa Article 3	red by this Inte 36.	rnational Preliminary Examining			
2. This	REP	ORT consists of a total of	of 4 sheets, including thi	is cove	r sheet.				
⊠	This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).								
The	se anı	nexes consist of a total of	of 2 sheets.		•				
3. This	s repoi	rt contains indications re	lating to the following ite	ems:					
1	\boxtimes	Basis of the opinion							
II		Priority				·			
m ·		Non-establishment of	opinion with regard to no	ovelty,	inventive step a	and industrial applicability			
IV Lack of unity of invention					•				
V	\boxtimes	Reasoned statement of citations and explanate	under Rule 66.2(a)(li) wit ions supporting such sta	h rega temen	rd to novelty, in	nventive step or industrial applicability			
VI		Certain documents cit	ed			•			
VII		Certain defects in the	international application						
VIII		Certain observations	on the international appli	cation					
Date of su	bmissio	on of the demand		Date o	f completion of the	nls report			
20.11.2003				07.10).2004				
Name and mailing address of the international preliminary examining authority:				Author	ized Officer	cooper Paleace			
European Patent Office D-80298 Munich					nas, D				
Tel. +49 89 2399 - 0 Tx: 523656 epmu d					200, D	2000 7007			

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/07567

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1. With regard to the **elements** of the international application (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)):

	Des	scription, Pages	
	1-3	3	as originally filed
	Cla	ims, Numbers	· .
	1-10	0	received on 08.07.2004 with letter of 05.07.2004
	Cla	ims, Pages	
	34-	35	received on 08.07.2004 with letter of 05.07.2004
2.	With lang	n regard to the langu guage in which the int	age, all the elements marked above were available or furnished to this Authority in the ernational application was filed, unless otherwise indicated under this item.
	The	se elements were av	ailable or furnished to this Authority in the following language: , which is:
		the language of a tra	anslation furnished for the purposes of the international search (under Rule 23.1(b)).
		the language of pub	lication of the international application (under Rule 48.3(b)).
		the language of a tra Rule 55.2 and/or 55.	anslation furnished for the purposes of international preliminary examination (under 3).
3. W in	Witl inte	n regard to any nucl e rnational preliminary	eotide and/or amino acid sequence disclosed in the international application, the examination was carried out on the basis of the sequence listing:
		contained in the inte	rnational application in written form.
		filed together with th	e international application in computer readable form.
		furnished subsequer	ntly to this Authority in written form.
		furnished subsequer	ntly to this Authority in computer readable form.
		The statement that t in the international a	he subsequently furnished written sequence listing does not go beyond the disclosure pplication as filed has been furnished.
		The statement that t listing has been furn	he information recorded in computer readable form is identical to the written sequence ished.
4.	The	amendments have r	esulted in the cancellation of:
		the description,	pages:
		the claims,	Nos.:
		the drawings,	sheets:

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International application No.

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5.	This report has been established as if (some of) the amendments had not been made, since they have
	been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-10

No: Claims

Inventive step (IS) Yes: Claims 1-10

No: Claims

Industrial applicability (IA) Yes: Claims 1-10

No: Claims

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: WO 9961487

Document D1, which is considered to represent the most relevant state of the art, discloses in example 3 a process for the preparation of a catalyst for olefin polymerization. An organic transition metal compound

(Dimethylsiandiyl bis (2.n-propyl-4-(4'-tert.-butyl-phenyl)indenyl)zirconium dichloride is first reacted with a five fold excess of trimethyl aluminum. The resulting mixture contains at least the following products:

- -(Dimethylsiandiylbis(2.n-propyl-4-(4'-tert.-butyl-phenyl)indenyl)zirconiumdimethyl
- -trimethyl aluminum
- -dimethyl aluminum chloride

The subject matter of claim 1 differs from the above described mixture as dimethyl aluminum chloride falls not under the definition of the organometallic compounds described in claim 1 under B (R₁₋₃ can not be CI)

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The independent claims 8-10 refer back to claim 1 and are therefore regarded to be new as well.

The technical effect brought by the above described difference is an improvement of the polymerization activity of the supported catalyst system.

(see example 1 of the application vs. comparative example A - a 2.5-fold increase of catalyst activity).

The objective technical problem to be solved is to provide a supported catalyst system with improved activity. None of the cited prior art documents disclose the use of two different organometallic compounds as defined under B of claim 1 of the present application in order to solve this problem.

The solution to this problem proposed in claim 1 of the present application is therefore considered as involving an inventive step (Article 33(3) PCT).

Claims 8-10 refer back to claim 1 and as such also meet the requirements of the PCT inventive step.



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new set of claims

We claim:

- 1. A process for preparing a catalyst for olefin polymerization which is obtainable by bringing
- 5 A) at least one organic transition metal compound,
 - B) a mixture of at least two different organo metallic compounds of formula (V),

$$M^{1}(R^{1})_{r}(R^{2})_{s}(R^{3})_{t}$$
 (V)

10 where

M¹ is an alkali metal, an alkaline earth metal or a metal of group 13 of the Periodic Table.

R¹ is hydrogen, C_1 - C_{10} -alkyl, C_6 - C_{15} -aryl, halo- C_1 - C_{10} -alkyl, halo- C_6 - C_{15} -aryl, C_7 - C_{40} -arylalkyl, C_7 - C_{40} -alkylaryl, C_1 - C_{10} -alkoxy or halo- C_7 - C_{40} -alkylaryl, halo- C_7 - C_{40} -arylalkyl or halo- C_1 - C_{10} -alkoxy,

 R^2 and R^3 are each hydrogen, $C_1\text{-}C_{10}\text{-}alkyl,\,C_6\text{-}C_{15}\text{-}aryl,\,halo-}C_1\text{-}C_{10}\text{-}alkyl,\,halo-}C_6\text{-}C_{15}\text{-}aryl,\,C_7\text{-}C_{40}\text{-}arylalkyl,\,}C_7\text{-}C_{40}\text{-}alkylaryl,\,}C_1\text{-}C_{10}\text{-}alkoxy or halo-}C_7\text{-}C_{40}\text{-}alkylaryl,\,halo-}C_7\text{-}C_{40}\text{-}arylalkyl or halo-}C_1\text{-}C_{10}\text{-}alkoxy,\,}$

r is an integer from 1 to 3

: and

s and t are integers from 0 to 2, where the sum r+s+t corresponds to the valence of M^1 ,

and

- C) at least one cation-forming compound
- into contact with one another, wherein the organic transition metal compound A) is firstly combined with the mixture of the organo metallic compounds B).

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- 2. A process for preparing a catalyst for olefin polymerization as claimed in claim 1, wherein
 - D) at least one support
- 5 is used as further component.
 - 3. A process for preparing a catalyst for olefin polymerization as claimed in claim 1 or 2, wherein
- 10 E) at least one Lewis base

is used as further component.

- A process for preparing a catalyst for olefin polymerization as claimed in any of claims 1 to
 3, wherein the cation-forming compound is a strong uncharged Lewis acid, an ionic compound having a Lewis-acid cation, an ionic compound containing a Brönsted acid as cation or a compound of the aluminoxane type.
- 5. A process for preparing a catalyst for olefin polymerization as claimed in any of claims 1 to
 4, wherein the cation-forming compound is obtained during the preparation of the catalyst
 by reaction of a compound having at least one functional group containing active hydrogen
 with an organometallic compound.
- 6. A process for preparing a catalyst for olefin polymerization as claimed in claim 5, wherein the compound having at least one functional group containing active hydrogen is a hydroxyl-containing compound.
- A process for preparing a catalyst for olefin polymerization as claimed in claim 6, wherein the hydroxyl groups are bound to an element of main group 13, 14 or 15 of the Periodic
 Table.
 - 8. The use of a catalyst prepared as claimed in any of claims 1 to 7 for the polymerization of olefins.
- 35 9. A catalyst obtainable by a process as claimed in any of claims 1 to 7.
 - 10. A process for the polymerization of olefins using a catalyst as claimed in claim 9.

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